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09/986,320	11/08/2001	William W. Anderson	18180.0150	5195

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EXAMINER	
SINGH, DALZID E	

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 03/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/986,320	ANDERSON ET AL.	
	Examiner	Art Unit	
	Dalzid Singh	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 November 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/17/01;8/6/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 4 is objected to because of the following informalities: claim 4 is depending on itself. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, recites the limitation "...introducing the CPM onto the optical signal ..." It is unclear how the CPM is introduce onto the optical signal. Is CPM introduced by way of modulation of the optical signal? As disclosed in the specification, as originally filled, on page 6, lines 13-17, the CPM is achieved by lightwave circuit which generate photocurrent in accordance with mathematical function. Based on this, it appears that the CPM is derived from the superimposed modulated optical signals, as shown in Fig. 1. Therefore, introducing the CPM onto the optical signal as written in the claim is unclear.

4. Claim 1 recites the limitation "...onto the optical signal..." in line 9. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Delavaux et al (US Patent No. 6,850,712) in view of Hardcastle (US Patent No. 5,422,752).

Regarding claim 1 (as far as understood), Delavaux et al disclose optical transmission system, as shown in Fig. 7, the method comprising:

generating, from an input coherent optical signal, a frequency shifted optical signal (in col. 2, lines 40-41, Delavaux et al disclose coherent optical signal; see col. 5, lines 32-33, the optical signal is frequency shifted); and,

generating, from the input coherent optical signal, a pure phase modulated optical signal, the phase modulation corresponding to an information data stream (see col. 5, lines 34-37, the electro-optic modulator introduces data signal and phase modulating the signal; see also col. 4, lines 47-49).

Delavaux et al disclose optical transmission system comprising phase modulation corresponding to data signal, as discussed above, and differ from the claimed invention in that Delavaux et al do not specifically disclose generating phase modulated photocurrent signal, the phase modulation corresponding to the information data stream. However, generating a photocurrent of the phase modulated optical signal

is well known. Hardcastle is cited to show such well known concept. In Fig. 1, Hardcastle shows photodetector (24a and 24b) for detecting and generating photocurrent of the optical signal. Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention as made to provide a photodetector as taught by Hardcastle to the transmission system of Delavaux et al in order to generate photocurrent. One of ordinary skill in the art would have been motivated to do such in order to receive the transmitted signal or monitor signal quality.

Regarding claim 2, as shown in Fig. 7, Delavaux et al show generating a first optical signal and a second optical, wherein the first optical signal and the second optical signal each represent nominally one half of an input optical signal (the coupler (C), split the optical signal into a first optical signal and second optical signal; in col. 5, lines 27-29, the coupler split the optical signal into equal power components, therefore each optical signal represents nominally one half of an input optical signal).

Regarding claim 3, as shown in Fig. 7, Delavaux et al show that the step of generating the frequency shifted optical signal consists of diffracting the first optical signal with an acoustic wave of a carrier signal (AOM is acousto-optic modulator which generate frequency shift by acoustic wave; see col. 5, lines 31-34).

Regarding claims 4 and 15, Delavaux et al disclose that the carrier signal is one of: IF and RF frequency (see col. 6, lines 5-6).

Regarding claim 5, as discussed above, Delavaux et al disclose the step of generating the pure phase modulated optical signal includes passing the second optical

signal through an electro-optically active medium subject to an electric field containing an information data stream (see claim 1).

Regarding claim 6, as shown in Fig. 7, Delavaux et al show that generating two superposed optical signals (the superimpose signal is generated by combining two modulated signal by PBC).

Regarding claims 7 and 18, as shown in Fig. 7, Delavaux et al show that generating the two superposed optical signals include superposing the pure phased modulated signal and the frequency shifted optical signal (the phase modulated signal is generated by EOM and the frequency sifted signal is generated by AOM; the two modulated signals are superimposed by PBC; see claims 1 and 6).

Regarding claims 8 and 19, as discussed above, the combination of Delavaux et al and Hardcastle disclose that the optical signal is frequency shifted and phase modulated (see claim 1) in which the two optical signals are superimposed and differ from the claimed invention in that the combination does not specifically disclose the two superposed optical signals are phase shifted from one another by $\pi/2$. However, the combination (Delavaux et al) clearly suggest that the optical signal is frequency shifted. Based on this teaching, it would have been obvious to an artisan at the time of the invention to adjust the frequency shift to be within the predetermined value such as $\pi/2$. Furthermore, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Swain et al.*, 33 CCPA (Patents) 1250, 156 F.2d 239, 70 USPQ 412; Minnesota Minning and Mfg. Co. v. Coe, 69 App D.C. 217, 99 F.2d 986, 38 USPQ 213; Allen et al.

v. Coe, 77 App D.C. 324, 135 F.2d 11, 57 USPQ 136. In addition, discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. *In re Antonie*, 559 F.2d 239, 618, 195 USPQ 6 (CCPA 1977); *In re Aller,* 42 CCPA 824, 220 F.2d 454, 105 USPQ 233 (1955). See also *In re Aller,* 105 USPQ 233 (CCPA 1955) and *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore, it would have been obvious to set the phase shift of the optical signal to an optimum or workable value or range by routine experimentation.

Regarding claim 9, Delavaux et al disclose optical transmission system comprising phase modulation corresponding to data signal and superimposing of the optical signal, as discussed above, and differ from the claimed invention in that Delavaux et al do not specifically disclose generating separate photocurrents for each of the two superposed optical signals. However, generating a photocurrent of the superimposed phase modulated optical signal is well known. Hardcastle is cited to show such well known concept. In Fig. 1, Hardcastle shows photodetector (24a and 24b) for detecting and generating photocurrent of the superimpose optical signal. Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention as made to provide a photodetector as taught by Hardcastle to the transmission system of Delavaux et al in order to generate superimposed photocurrent of the optical signal. One of ordinary skill in the art would have been motivated to do such in order to receive the transmitted signal or monitor signal quality.

Regarding claims 10 and 21, the combination of Delavaux et al and Hardcastle disclose detection of optical signal (see Fig. 1 of Hardcastle) comprising of discriminator

circuit (30) and differ from the claimed invention in that the combination does not specifically disclose removing a DC current from the pure phase modulated photocurrent signal. However, since the combination (Fig. 1 of Hardcastle) show discriminator circuit (30) to remove certain component of the signal, therefore it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to tune the discriminator circuit in order to remove DC current. One of ordinary skill the art would have been motivated to do such in order to remove any noise associated with DC component of the signal.

Regarding claim 11, Delavaux et al disclose optical transmission system, as shown in Fig. 7, the comprising:

a first modulator (AOM (22)) operable to generate a frequency shifted optical signal; and,

a second modulator (EOM (44)) operable to generate a pure phase modulated optical signal.

Delavaux et al disclose optical transmission system comprising phase modulation corresponding to data signal, as discussed above, and differ from the claimed invention in that Delavaux et al do not specifically disclose a set of detectors for generating a pure phase modulated photocurrent signal, the phase modulation corresponding to the information data stream. However, generating a photocurrent of the phase modulated optical signal is well known. Hardcastle is cited to show such well known concept. In Fig. 1, Hardcastle shows a set of detector (24a and 24b) for detecting and generating photocurrent of the optical signal. Therefore, it would have

been obvious to an artisan of ordinary skill in the art at the time the invention as made to provide a set of detector as taught by Hardcastle to the transmission system of Delavaux et al in order to generate photocurrent. One of ordinary skill in the art would have been motivated to do such in order to receive the transmitted signal or monitor signal quality.

Furthermore, since the system of the combination of Delavaux et al and Hardcastle discloses generation of photocurrent of the superimposed optical signal comprising of frequency shifted optical signal and phase modulated optical signal, which is the same system as disclosed by applicant, therefore it appears that the system of the combination performs implementation of CPM which allows modulation in high data rate applications by increasing the upper limit on data rates and throughput capacity by performing the modulation functions on optical frequency signals.

Regarding claim 12, as shown in Fig. 7, Delavaux et al show optical transmission system comprising:

a splitter (C), coupled to an input of the first modulator (AOM (22)) and an input of the second modulator (EOM (44), operable to generate a first optical signal and a second optical, wherein the first optical signal and the second optical signal each represent nominally one half of an input optical signal (the coupler (C), split the optical signal into a first optical signal and second optical signal; in col. 5, lines 27-29, the coupler split the optical signal into equal power components, therefore each optical signal represents nominally one half of an input optical signal).

Regarding claim 13, as shown in Fig. 7, Delavaux et al show that the first modulator diffracts the first optical signal with an acoustic wave of a carrier frequency signal (AOM is acousto-optic modulator which generate frequency shift by acoustic wave; see col. 5, lines 31-34).

Regarding claim 14, as shown in Fig. 7, it appears that the first modulator selects a propagation direction with respect to the propagation direction of the carrier frequency acoustic wave for the first optical signal (see claim 13).

Regarding claim 16, as discussed above, Delavaux et al shows that the second modulator (EOM (44)) provides an electric field provided with an information data stream for phase modulating the second optical signal (see claim 1).

Regarding claim 17, as shown in Fig. 7, Delavaux et al show a coupler (26) coupled to an output of the first modulator (AOM (22)) and an output of the second modulator (EOM)), operable to generate two superposed optical signals.

Regarding claim 20, as discussed above, the combination of Delavaux et al and Hardcastle disclose set of detectors operable to generate a photocurrent for each of the two superposed optical signals (see claim 11).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bekooij (US Patent No. 4,918,747) is cited to show coherent optical communication with heterodyne detection.

Strutz et al (US Patent No. 6,487,004) is cited to show optical image reject down converter.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalzid Singh whose telephone number is (571) 272-3029. The examiner can normally be reached on Mon-Fri 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272--3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DS
March 10, 2005

M. R. Sedighian
M. R. SEDIGHIAN
PRIMARY EXAMINER